Deepak RAVIKUMAR

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I am a Ph.D. candidate at Purdue ECE with 2+ years of industry and teaching experience looking to secure a full time role starting in spring 2025. I focus on trustworthy machine/deep learning with 10+ publications and patents in top-tier venues.

EDUCATION

Electrical and Computer Engineering — *Ph.D.*   MAY 2019 - EXP. 2025 SPRING
Purdue University, West Lafayette, Indiana, USA   GPA: 3.93/4.00

Electrical and Computer Engineering — *M.S.*   AUG 2017 - MAY 2019
Purdue University, West Lafayette, Indiana, USA   GPA: 4.00/4.00

Electronics and Communications Engineering — *B.E.*   AUG 2012 - JUN 2016
M.S. Ramaiah Institute of Technology, Bangalore, Karnataka, India   GPA: 9.74/10.00

WORK EXPERIENCE

Research Assistant — *Purdue University, West Lafayette*   JAN 2018 - PRESENT
Advisor: Prof. Kaushik Roy
- Researched Deep Learning security and robustness, specifically out-of-distribution detection, adversarial attacks, differential privacy and memorization in deep neural nets.
- Mentored Undergraduate researchers and collaborated with peers to research memorization and privacy in deep neural networks.
- Was the teaching faculty for Advanced C Programming (ECE 264, Summer '18) and VLSI Design (Fall '20). Was the head TA for Microprocessor System Design (ECE 362), managed ≈ 20 lab staff, and designed coursework for the labs.

Machine Learning Research Intern — *Aizenn Corporation, West Lafayette*   JULY 2024 - AUG 2024
Host: Dr. Chamika Liyanagedera
- Researched time series based forecast for PD fault detection using transformer model. Helped towards a multi-million dollar contract.
- Utilized React, Docker, Node.js, and Apache deployed on AWS ECS to deliver an efficient and scalable solution.
- Addressed and resolved challenges related to remote data acquisition and analytics, ensuring seamless functionality and performance.

Machine Learning Intern — *Microsoft Corporation, Redmond*   MAY 2022 - AUG 2022
Host: Dr. Yiwen Zhu and Alex Yeo
- Researched and deployed Time Series Machine Learning model and pipeline for forecasting Azure Spark usage patterns using python and Cosmos DB. The deployed model saved several million dollars in running costs.
- Filed for a patent on the findings and published the paper at a top tier venue.

Software Engineer — *National Instruments Corporation, Bangalore*   JUN 2016 - JUL 2017
- Developed new capabilities and added features to a high precision data acquisition tool and its infrastructure using WPF and .NET.
- Improved product performance (improved latency and removed memory leaks) and developed an onboarding program to train interns and new hires on the software and hardware infrastructure.

Software Engineering Intern — *National Instruments Corporation, Bangalore*   JUN 2016 - JUL 2017
- Prototyped new features for NI's high precision measurement tools and pushed code into production.

PUBLICATIONS

- Timur Ibrayev*, *Deepak Ravikumar*, Manish Nagaraj, Amogh Joshi and Kaushik Roy "Vis-A-ViQA: A Dataset of Task-Driven Human Visual Attention in Video Question Answering", under review CVPR 2025.
- *Deepak Ravikumar*, Efstathia Soufleri, Abolfazl Hashemi, and Kaushik Roy. "Memorization and the Orders of Loss: A Learning Dynamics Perspective", under review ICLR 2025.
- Sangamesh Kodge, *Deepak Ravikumar*, Gobinda Saha, and Kaushik Roy. "SAP: Corrective Machine Unlearning with Scaled Activation Projection for Label Noise Robustness", **Annual AAAI Conference on Artificial Intelligence (AAAI) 2025**.
- *Deepak Ravikumar*, Efstathia Soufleri, and Kaushik Roy. "Curvature Clues: Decoding Deep Learning Privacy with Input Loss Curvature", **Neural Information Processing Systems (NeurIPS) 2024, Spotlight (≈ Top 2%)**.
- *Deepak Ravikumar*, Efstathia Soufleri, Abolfazl Hashemi, and Kaushik Roy. "Unveiling Privacy, Memorization, and Input Curvature Links", **International Conference on Machine Learning (ICML) 2024.**
- Isha Garg, *Deepak Ravikumar*, and Kaushik Roy. "Memorization through the lens of curvature of loss function around samples", **International Conference on Machine Learning (ICML) 2024, Spotlight (Top 3.5%).**
- *Deepak Ravikumar*, Gobinda Saha, Sai Aparna Aketi, and Kaushik Roy. "Homogenizing non-iid datasets via in-distribution knowledge distillation for decentralized learning." In 2024 **Transactions on Machine Learning Research (TMLR).**
- Efstathia Soufleri, *Deepak Ravikumar*, and Kaushik Roy. "DP-ImgSyn: Dataset Alignment for Obfuscated, Differentially Private Image Synthesis", In 2024 **Transactions on Machine Learning Research (TMLR).**

- *Deepak Ravikumar*, Alex Yeo, Yiwen Zhu, Aditya Lakra, Harsha Nagulapalli, Santhosh Ravindran, Steve Suh et al. "Intelligent Pooling: Proactive Resource Provisioning in Large-scale Cloud Service." **Proceedings of the VLDB Endowment 17**, no. 7 (2024): 1618-1627.
- *Deepak Ravikumar*, Sangamesh Kodge, Isha Garg, and Kaushik Roy. "Intra-class mixup for out-of-distribution detection." **IEEE Access 11** (2023): 25968-25981.
- *Deepak Ravikumar*, Sangamesh Kodge, Isha Garg, and Kaushik Roy. "TREND: Transferability-Based Robust ENsemble Design." **IEEE Transactions on Artificial Intelligence 4**, no. 3 (2022): 534-548.
- *Deepak Ravikumar*, and Kaushik Roy. "Norm-scaling for out-of-distribution detection." arXiv preprint arXiv:2205.03493 (2022).
- *Deepak, R.*, Akshay K. Kallianpur, M. V. Bharath, and K. Shreedarshan. "Quadrature carrier multiplexing based digital video compression." In 2016 Second International Conference on Research in Computational Intelligence and Communication Networks (ICRCICN), pp. 1-5. IEEE, 2016.
- *Deepak, R.*, Abhishek Vasant Nayak, and K. Manikantan. "Ear detection using active contour model." In 2016 International Conference on Emerging Trends in Engineering, Technology and Science (ICETETS), pp. 1-7. IEEE, 2016.
- Manish Nagaraj, *Deepak Ravikumar*, Efstathia Soufleri, and Kaushik Roy. "The Relevancy Metric: Understanding the Impact of Training Data", under review ICLR 2025.
- Efstathia Soufleri, *Deepak Ravikumar*, and Kaushik Roy. "Advancing Compressed Video Action Recognition through Progressive Knowledge Distillation." arXiv preprint arXiv:2407.02713, under review CVPR 2025.

PATENTS

- Zhu, Yiwen, Alex Yeo, Harsha Nihanth Nagulapalli, Sumeet Khushalani, Arijit Tarafdar, Subramaniam Venkatraman Krishnan, Deepak Ravikumar et al. "Proactive resource provisioning in large-scale cloud service with intelligent pooling." U.S. Patent Application 18/152,391, filed July 11, 2024.

AWARDS

- 2024 NeurIPS Spotlight Paper ($\approx$ Top 2%)
- 2024 ICML Spotlight Paper 3.5% acceptance rate
- 2020 Recipient of Purdue ECE Summer Research Grant
- 2019 Recipient of Magoon Award for Teaching excellence at Purdue University
- 2017 Awarded for being one of the top 3 best papers at National Instruments Tech conference
- 2016 Bronze Medal for academic excellence from RIT (Ramaiah Institute of Technology)
- 2015 Won the Texas Instruments Circuit Analysis Competition at MSRIT
- 2012 Awarded Scholarship for Higher Education for being within top 1% in Senior School Certificate Examinations

TEACHING

- *Fall 2020* - I was the Faculty Lecturer for VLSI Design Purdue ECE 559, taught a graduate level class of about 40 students (in person and remote from several countries around the globe). Worked with a teaching assistant for the lab component associated with the course. The role included teaching responsibilities, lab responsibilities, developing the course material and grading.
- *Summer 2018* - I was the Lecturer for Advanced C Programming (Purdue ECE 264) handled a class of about 35 undergraduate students. The role included teaching responsibilities, lab responsibilities, developing the course material and grading.
- *Fall 2017 - Spring 2020* - I was the Teaching Assistant for Microprocessor System Design (Purdue ECE 362) in non-summer semesters. I was the Head Teaching Assistant from Fall 2018 - Spring 2020 where I managed 3 other graduate TAs, about 40 undergraduate TAs and developed the lab material for the course. I also developed a web based ARM Cortex M0 simulator for student use.

TALKS

- 2024 "Curvature Clues: Decoding Deep Learning Privacy with Input Loss Curvature", NeurIPS '24, Dec 2024.
- 2024 "Learning to Forget: How, What and Why?", Collins Aerospace, RTX, Nov 2024.
- 2024 "Dataset Integrity: A Curvature Perspective", CoCoSys SRC Jump 2.0 Center Theme Meeting, August 2024.
- 2024 "Unveiling Privacy, Memorization, and Input Curvature Links", ICML, July 2024.
- 2020 "TREND: Transferability based Robust ENsemble Design", Center for Brain Inspired Computing Review 2020.

SERVICE

- Reviewer for ICML '24, NeurIPS '24, WACV '25, ICLR '25, AISTATS '25, CVPR '25.
- Reviewer for IEEE Transactions on Signal Processing, IEEE Transactions on Neural Networks and Learning System, Transactions on Machine Learning Research (TMLR).
- Edited Chapter 3 of the textbook, "Introduction to Probability for Data Science", by Prof. Stanley H. Chan.

SKILLS

- Python, PyTorch, Tensorflow, Shell Script (Bash Linux), Docker, Javascript, .NET, C, C++, C#, NodeJS, Spark, CSS, React, Java, Verilog, WPF, HTML, gdb, Memory and Performance Profiling, MySQL, Azure Cosmos, AWS EC2, ECS, ECR, S3.
- Research, Design, Prototyping, Problem Solving, Debugging (pdb - Python Debugger), VS Code, Version Control (git)

Relevant Coursework

- **Machine Learning courses**: Deep Learning, Introduction to Neural Networks, Generative Models, Artificial Intelligence, Machine Learning-I, Machine Learning-II, Convex and Stochastic Optimization and Applications, Optimization for Deep Learning
- **Computer Engineering courses**: Data Structures, Computational Models and Methods, Prog. Parallel Machines, Computer Architecture
- **Math courses**: Linear Algebra and Applications, Graph Theory, Differential Equations
- **Online courses**: NLP with Deep Learning (LLM)

Languages

- English (Full Professional Proficiency), Kannada (Native), Hindi (Fluent)